

DT01 Rec'd PCT/PTC 04 FEB 2005

## Description

Error handling of user information received via a communications  
5 network

The invention relates to a method and a device for error correction  
of user information received via a communications network.

10 In cellular text telephony, a cascade of a cellular radio receiver  
(e.g. GSM modem) and a CTM receiver (Cellular Text telephone Modem)  
is provided for received texts. A real example is the US American  
text telephony standard (see 3GPP TS 26.226) in which text is first  
converted into audio signals by digital coding of an alphabet,  
15 channel coding and frequency modulation, and then the audio signals  
are processed further (voice coding, channel coding) in the same way  
as normal speech by cellular radio terminals (cellular radio modems)  
and transmitted via a cellular radio channel. In order to guarantee  
the reliable transmission of emergency calls, maximum error rates  
20 are specified for the transmission of the individual letters (see  
3GPP TS 26.231). A CTM receiver and a cellular radio receiver are  
not highly compatible, however, and the complete system (cellular  
radio + CTM) cannot achieve a sufficiently good performance, in  
particular in the sense of the transmission efficiency, for the  
25 following reasons:

- A cellular radio voice coder/decoder (such as the AMR) in  
cellular radio is optimized for coding/decoding of human speech.  
For the artificially generated (CTM) audio signals, the voice  
30 coder/decoder is not efficient.
- Under poor channel conditions, the error concealment, which is  
optimized for the human ear, is no longer satisfactory for the  
transmission of text information.

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The object of the invention is to propose a method and a device in a communications network that will better satisfy requirements in the transmission of data containing user information.

5 The object is achieved according to the invention by the subjects of the independent Claims relating to the method and the device. Accordingly, the transmission characteristic of the voice channel, in combination with additionally conveyed data on the data rate of the voice coder and the channel quality determined in the channel  
10 decoder, is converted in the CTM receiver into a reliability measure. This reliability measure is used in the error correction of the received data in the CTM receiver in order to reconstruct the transmit signal with as few errors as possible. During the decoding of the voice-channel signal, in particular in the AMR voice decoder,  
15 there is also the option to disable voice-synthesis mechanisms that are optimized for the human ear and have a detrimental effect on the transmission of audio signals (error concealment). Hence the information in the CTM receiver that a CTM-text audio signal is being transmitted, is conveyed to the voice decoder in order to  
20 optimize the voice synthesis for user information (CTM-text audio signal) and not for human speech. A piece of user information is the information that is inserted into the stream of data at the transmitter end, and re-extracted from the data at the receiver end, such as text, voice signals, image signals, video signals etc.,  
25 where the data is the received signals that are coded in a typical way for the transmission.

Some pieces of additional information are exchanged between the CTM receiver and the communications terminal receiver, for instance a  
30 cellular radio terminal, fixed network terminal etc., primarily the BFI and AMR-mode parameters from the communications terminal receiver, and the CTM-signal indicator from the CTM text receiver. The performance of the overall system is improved substantially by this. Since the method only relates to the receiver end, the  
35 standard is unaffected.

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## Claims

1. Method for the decoding and/or detection of data, containing  
5 user information, that was received via the communications network,  
characterized in that  
a communications terminal receiver (5) and a CTM receiver (6)  
exchange at least one piece of additional information concerning the  
reliability of the correct reception of the data, and an error  
10 handling of the received data is modified on the basis of this in a  
receiver (5, 6).
2. Method according to Claim 1,  
characterized in that  
15 the error concealment in the voice decoder (2) is suppressed as a  
means of modifying the error handling.
3. Method according to Claim 2,  
characterized in that  
20 a CTM text/voice indicator, that indicates that the data is CTM text  
data, is sent to the voice decoder (2) of the communications  
terminal receiver (5) in order to suppress the error concealment.
4. Method according to one of the preceding Claims,  
25 characterized in that  
the error correction in the error-correction module (4) is modified  
as a means of modifying the error handling.
5. Method according to one of the preceding Claims,  
30 characterized in that  
a cellular mobile communications network is used as the  
communications network.
6. Method according to one of the preceding Claims,  
35 characterized in that

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the communications terminal receiver (5) is a receiver in a cellular radio terminal.

7. Method according to one of the preceding Claims,

characterized in that

at the end of the CTM text transmission, the CTM text/voice indicator is set to a value that indicates that the subsequently received data now contains voice information.

8. Method according to one of the preceding Claims,

characterized in that

the communications terminal receiver (5) is an AMR receiver.

9. Method according to one of the preceding Claims,

characterized in that

at least one piece of additional information is added by the communications terminal receiver (5) to the received data.

10. Method according to one of the preceding Claims,

characterized in that

at least one piece of additional information concerning the data to be transmitted is forwarded by the communications terminal receiver (5) to the CTM receiver (6) for controlling the error correction of the data.

11. Method according to one of the Claims 5-10,

characterized in that

the BFI (Bad Frame Indicator) and/or AMR mode additional information is exchanged between the communications terminal receiver (5) and a CTM receiver (6).

12. Method according to one of the preceding Claims,

characterized in that

at least one piece of information concerning the data to be transmitted is exchanged in unused bits of the data.

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13. Method according to one of the preceding Claims,  
characterized in that  
the additional information received by the CTM receiver (6) is used  
for error correction of the data.

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14. Method according to one of the preceding Claims,  
characterized in that  
a reliability measure concerning the quality of the cellular radio  
transmission and/or the demodulation and/or decoding of the user  
10 data is calculated by the CTM receiver (6) from the sound quality of  
the channel decoder (1) and the data rate of the voice decoder (2).

15. Method according to Claim 14,  
characterized in that

15 this reliability measure is used in the error correction of the user  
information in the CTM receiver (6).

16. Method according to one of the preceding Claims,  
characterized in that

20 the user information consists of text, voice signals, image signals  
and/or video signals.

17. Device for the decoding and/or detection of data, containing  
user information, that was received via the communications network,  
25 having a channel decoder (1) in a communications terminal receiver  
(5) for the analysis and at least partial correction of the received  
data and for forwarding this to a voice decoder (2),

having a voice decoder (2) for decoding the data using error  
concealment, where it is required, and for forwarding the user  
30 information to its CTM receiver (6),

having a demodulator (3) in the CTM receiver (6) for the  
demodulation and for forwarding this data with the reliability  
information to an error-correction module (4),  
having an error-correction module (4) for scanning the received user  
35 information for a sequence, in order to set in a CTM text/voice  
indicator, when the sequence is successfully detected, a value that

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indicates that the data is CTM data, for modifying the error correction and for forwarding the set CTM text/voice indicator to the voice decoder (2) in order to suppress the error concealment in the voice decoder (2).

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18. Device according to Claim 17,  
having an error-correction module (4) for error correction of the data containing the user information.

- 10 19. Device according to one of the preceding Claims,  
characterized in that  
a voice decoder (2) is used for forwarding a pulse code modulation signal.

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